

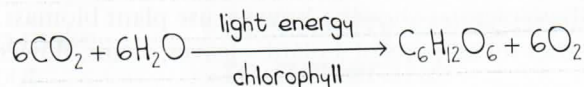
- Respiration and photosynthesis
- Green plants and the environment

Making food and getting energy

Fatima's younger brother Joe was asking her how plants eat. Having studied biology in Year 9, Fatima explained how plants photosynthesise to make their own food. She wrote down the word equation and symbol equation for photosynthesis, to make sure Joe would remember.

Photosynthesis

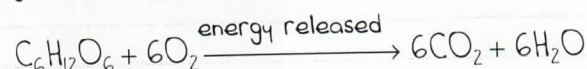
carbon dioxide + water $\xrightarrow[\text{chlorophyll}]{\text{light energy}}$ glucose + oxygen



Fatima remembered that animals break down their food to get energy in respiration, and plants do the same thing. Plants respire to get the energy from the food they have made. She wrote down the word equation for respiration. The symbol equation for this reaction is shown underneath.

Respiration

glucose + oxygen $\xrightarrow{\text{energy released}}$ carbon dioxide + water



- a** Look at the two equations for photosynthesis and respiration. (i) What is similar about them?
(ii) What is different?

Day and night

Three pupils were discussing plant photosynthesis and respiration.

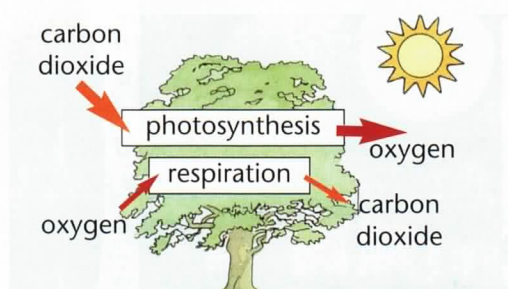
- b** Which idea do you think is right? Explain your answer.

Plants photosynthesise during the day and respire only at night.

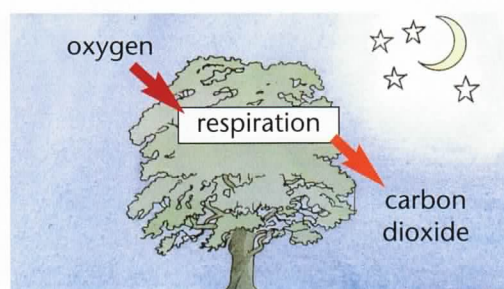
Plants photosynthesise during the day and respire all the time.

Plants photosynthesise at night and respire all the time.

Look at the pictures to see what happens during the day and during the night.



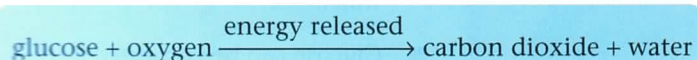
Photosynthesis is faster than respiration during the day.



Only respiration takes place at night.

- c** Which gas do plants make both during the day and at night?
d Which gas do plants make only during the day?

In respiration, plants break down the glucose they have made in photosynthesis. Look at the equation for respiration again:



- Glucose comes from photosynthesis. Oxygen comes from photosynthesis during the day and from the air at night.
- Carbon dioxide is released through the stomata at night, and is used in photosynthesis during the day.

Why are rainforests important?

Look at this graph showing carbon dioxide levels in the atmosphere since 1700.

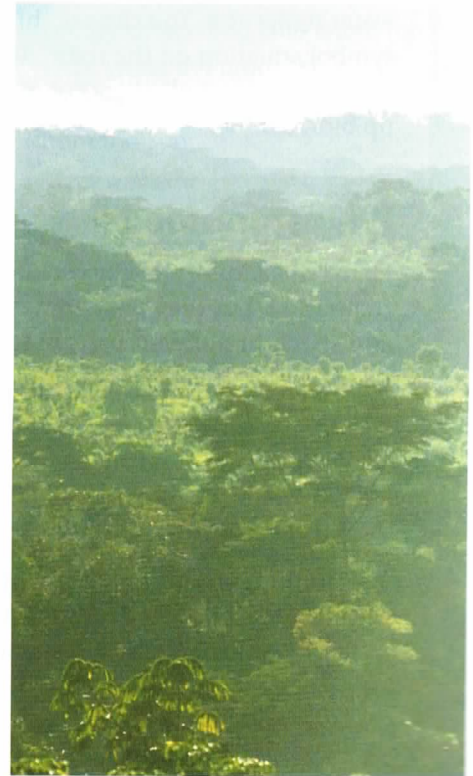
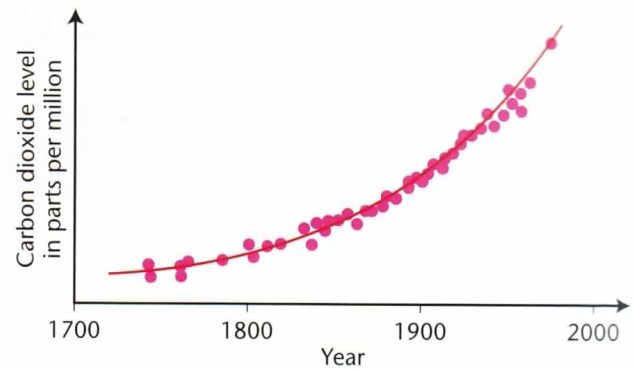
- e** Describe how quickly carbon dioxide levels in the atmosphere went up in the 1700s compared with how quickly they went up in the 1900s.

The rainforests are forests in tropical areas where it is warm and wet: conditions in which plants grow well. The rainforests cover huge areas of Africa, Asia and South America. Huge numbers of trees in the rainforests are being cut down, and scientists are very concerned about this.

Sometimes the forests are cleared so that the wood can be used for making paper, furniture or building materials. Sometimes the forests are just burned so the ground can be used for farming. People grow crops there which they can sell. The scientists are worried that all this tree felling will reduce the amount of photosynthesis, and carbon dioxide levels in the air will increase.

- f** If there are fewer trees photosynthesising in the rainforests, explain what you would expect to happen to global oxygen levels.

We all need oxygen for respiration, and we rely on plants to produce it by photosynthesis. More carbon dioxide in the air could increase global warming.



Questions

- 1** Students often find photosynthesis and respiration confusing. Mr Jones wrote down things that students said in his lessons when they were confused. Help Mr Jones by writing down why each student got it wrong.

- a** Respiration only happens in animals.
b Respiration happens in plants only during the night.

- 2** Copy this table and complete it using ticks and crosses to show which gases a plant gives out and takes in.

	Day	Night
gives out carbon dioxide	✓	✓
takes in carbon dioxide		
gives out oxygen		
takes in oxygen		

- 3** Plants are often taken out of hospital wards at night. Can you think of a reason for this?
- 4** Mary keeps a greenhouse of orchid plants. By thinking about respiration and photosynthesis, predict how carbon dioxide and oxygen levels in the air inside the greenhouse will vary over 24 hours.
- 5** The balance between photosynthesis and respiration is essential in maintaining levels of gases in the atmosphere. Explain what will happen to carbon dioxide and oxygen levels if:
- a** respiration happens more than photosynthesis
b photosynthesis happens more than respiration.

For your notes:

- Plants release energy from food by respiration, just like animals. Respiration takes place in every cell of a plant.
- Plants make their food, whereas animals must eat theirs.
- Cutting down rainforests may increase carbon dioxide levels in the air around the Earth.